EVIDENCE of progress in various departments and grades of education in Liverpool is afforded by the report of the Technical Instruction Committee for the year 1899. Though nothing has yet been done by legislation to improve the local organisation of education, or to promote the unification of local administration, steps have been taken in Liverpool towards the co-ordination of educational effort in the City, and so promote harmonious development. By reconstituting its Technical Instruction Committee so as to include not only educational experts nominated by the City Council itself, but also a considerable proportion of representatives of the School Board, and others nominated by the University College and the secondary schools, a local authority has been established for the administration of technical and secondary education—though the functions of the Committee as regards the latter branch are necessarily for the present mainly consultative and advisory. By bringing within the influence of one administrative body, consisting of representatives from all the recognised important public and professional educational organisations in the City, the various special branches of Technical Education, the Committee hope to ensure the continued success and the progressive development of such work as is required by the needs of the City. As the Committee has been recognised by the Department of Science and Art as an organisation for the promotion of secondary education, it will be free to encourage any branches of technical and higher education which are considered deserving of support.

A RETURN just published as a Blue Book shows that the total amount expended on technical education during the year 1897-8 in England, Wales and Ireland was 860,105*l.*; and that the estimated total expenditure on technical education during the year 1898-9 was 874,612*l.* These amounts are exclusive of the sums allocated to intermediate and technical education under the Welsh Intermediate Education Act, 1889. The amounts raised by loan on the security of the local rate under the Technical Instruction Acts were—in 1897-8, 69,334*l.*; in 1898-9, 133,583*l.* The total amount of the residue received under the Local Taxation (Customs and Excise) Act, by the councils of counties and county boroughs in England (excepting the County of Monmouth) in respect of the financial year 1897-8 was 834,827*l.*, of which 759,400*l.* was appropriated to educational purposes, and 75,426*l.* to relief of rates; the latter sum including 42,108*l.* devoted by the London County Council to relief of rates. The total amount expended on technical education during the year 1897-8 was 826,450*l.*, and the estimated total expenditure during the year 1898-9 was 834,908*l.* The total amount of the residue paid to the thirteen County Councils and the Councils of the three County Boroughs in Wales and Monmouth was 40,062*l.*, and these local authorities are devoting the whole of it to intermediate and technical education, chiefly under the Welsh Intermediate Education Act, 1889. The estimated total amount to be devoted annually to intermediate and technical education, under the Welsh Intermediate Education Act—*i.e.* out of the residue and the local rate—is 43,304*l.* In the case of Ireland, the return shows that the total amount expended on technical education by twelve local authorities during the year 1897-8 was 5649*l.*, and that the estimated total expenditure on technical education by twelve local authorities during the year 1898-9 was 4523*l.*

PROF. ROBERT WALLACE, professor of agriculture and rural economy in the University of Edinburgh, does not agree with the suggestion of the Agricultural Education Committee that, in connection with elementary schools, provision should be made for practical work on plots of ground attached to the schools. In an address delivered a few weeks ago on "Nature Knowledge Teaching introduced by the Scotch Code of 1899" (Edinburgh: The Darien Press), he showed that many educational authorities at home and abroad are of the opinion that farm work at school as a means for training the sons of those who are engaged in agricultural pursuits is impracticable and valueless. Such work would only be playing at farming, and would not rouse into full vigour the real working power of a boy any more than playing at shops develops a knowledge of the laws of commerce. What is wanted is individual interest and responsibility, and a knowledge of principles. The practical work which might usefully be done is stated by Prof. Wallace as follows:—(*a*) Laboratory work, the collection of specimens of all sorts of suitable interesting objects, to form local school museums and home collections. (*b*) The systematic examination of specimens by the aid of lenses and other means. (*c*) The growth, for experimental purposes or for ornament, of a great variety of seeds, and of a select number of plants from bulbs, roots, and cuttings in flower-pots, which, on a scale suitable to the local circumstances, could be duplicated at home by individual pupils, by the pupils from one household, and even by groups of pupils who live contiguous to each other—it being so arranged that each member of the combination should have a right to claim the necessary attention to one or more pots as exclusively his or her own, while the lessons to be learned from all the pots would be common to every one. (*d*) Field demonstrations, in which the objects of interest would be, so to say, infinite in variety. (*e*) And for the benefit of older children and those who have left school, as well as the more enlightened of their parents, school libraries of useful books on rural subjects, which every one could not be expected to possess.

THE address delivered before the Association of Technical Institutions, on January 24, by the President, Sir Swire Smith, just published by the Association, contains many sound remarks upon technical education from the commercial and industrial aspects, and reasons why it should receive the most liberal national encouragement. A University Don once remarked to the parent who wished his son to take up some scientific subject: "Sir, we know nothing of science here, we don't even teach it," and this spirit (unfortunately, not unknown at the present time) is responsible for the prejudice which manufacturers have against the schools and higher education. Place by the side of the disdainful expression referred to, the following testimony of Sir Swire Smith as to the methods and benefits of education in the principles of science:—"In the dual enquiry of the Royal Commission on technical instruction, in which we investigated not only systems of education, but their effect upon industry in this and competing countries, we visited in each foreign country, wherever possible, those eminent industrial establishments whose products were largely exported to the United Kingdom. We followed the processes from the raw material to the finished product, and we interviewed the specialists responsible for excellence or superiority, nearly all of whom had been trained in technical schools. In visiting the schools in which this special knowledge had been obtained, we found students qualifying themselves for their special work in the factory, by pursuing courses of training under excellent teachers and with the most perfect apparatus. We did not see much of what may be called 'trade teaching,' although in some departments of industry, in textiles, for example, the designing, weaving, dyeing and finishing departments were in some cases very complete. The schools in their fundamental principles were claimed to be schools of science or art, *applied* to industry, and in many of the smaller towns the most important schools were teaching pure science and pure art as a basis, with departments for the application of science and art to local industries. The teaching of principles was the same in all the great schools, but in their application there was as much variety as in the industries and crafts to which the teaching was applied. But in following the students from the schools to the workshops and factories, and in ascertaining the effect of their instruction upon their calling, the evidence to my mind was conclusive that the great progress of our rivals may be traced directly to the influences of their schools. And not less convincing were the illustrations of technical training afforded under less favourable conditions than in our own country, proving that the same educational influences had been at work in advancing our own industries." No more sound expression as to what technical education should mean, and what may be expected from it, could be given than is included in Sir Swire Smith's remarks, and they should receive careful consideration from all who are concerned with the progress of national education and the development of our industries.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 25.—"On the Effects of Strain on the Thermo-electric Qualities of Metals. Part ii." By Prof. Magnus Maclean, D.Sc. Communicated by Lord Kelvin, G.C.V.O., F.R.S.

A.—"Thermo-electric difference between free wires and wires previously subjected to longitudinal extension and lateral compression, by drawing them through the holes of a draw-plate."

In Part i. of this paper, read to the Society on February 2, 1899, the object of the experiments was stated to be the determination of the *magnitude* of the thermo-electric effects obtained from any one metal strained and unstrained. The results then given were obtained from two wires of the same material, one wire being previously drawn through a draw-plate, so as to reduce it in size from No. 18 standard gauge (0·122 cm. diameter) to about No. 24 standard gauge (0·0559 cm. diameter).

The metals for which results were given in Part i. were copper (six specimens), lead (two specimens), platinoid, German silver, reostene and manganin.[1]

The present paper gives results of similar experiments made on specimens of commercial[2] and pure lead, obtained from Messrs. Johnson and Matthey; and specimens of annealed steel, of aluminium, and of nickel.

B.—"Thermo-electric difference between free wires and wires previously permanently elongated by longitudinal stresses."

Attempts were made to determine the thermo-electric difference between free wires and wires previously permanently elongated by a longitudinal stress. It was found difficult to elongate the hard wires permanently to any appreciable extent before they broke.

The greatest percentage permanent elongation that could be got in hard drawn copper, manganin, nickel and German silver was 0·7, 0·5, 0·7 and 0·5 respectively. The thermo-electric difference between the stretched and the unstretched wires was then determined, and the results are given.

C.—"Thermo-electric difference between free wires and wires under stress, producing (1) temporary elongation, (2) permanent elongation."

The hot junction was kept permanently at steam temperature during each set of experiments by an arrangement described. Increasing weights were added on to the wire to produce (1) temporary elongation, (2) permanent elongation. Three readings of the galvanometer were taken: (1) with a weight on the wire, (2) with a weight off, and (3) with the circuit broken. A heavier weight was hung on, and other three readings taken, and so on to the heaviest weight used in the experiments.

The readings of the galvanometer were in the same direction for all the wires tried with weights on and off, except for soft copper and iron. The greatest permanent elongation produced in any of the hard copper wires experimented on was 0·17 per cent., and for this permanent elongation the reading on the galvanometer was in the same direction for weights off and on, though always greater for the latter.

For the soft copper wire the readings were in the same direction for weights on and off up to a permanent elongation of 1 per cent. After a permanent elongation of 4·72 per cent. the current with weight on was 0·00103 mikroampere per degree from *stretched* to *unstretched* through the hot junction, while with the weight off the current was 0·00075 mikroampere per degree from *unstretched* to *stretched* through the hot junction.

For iron wire the current was in the same direction for weights on and off up to a permanent elongation of 0·35 per cent.; but after a permanent elongation of 3·41 per cent. the current with weight on was 0·00461 mikroampere per degree from *unstretched* to *stretched* through the hot jnnction, and with weight off 0·0069 mikroampere per degree from *stretched* to *unstretched* through the hot junction.

In "Mathematical and Physical Papers," vol. 2, p. 270, § 109, Kelvin says:—"I have thus arrived at the remarkable conclusion that when a permanent elongation is left after the withdrawal of a longitudinal force which has been applied to an iron or copper wire, the residual thermo-electric effect is the reverse of the thermo-electric effect which is induced by the force, and which subsists as long as the force acts."

It seems (1) that for small longitudinal strain in copper or in iron the direction of the current through the hot junction is the same, whether the force which produced the permaneut strain is on or off, (2) that as the permanent elongation is increased by increased longitudinal forces, a stage is reached which gives zero current when the forces are removed, and (3) that for greater longitudinal forces and permanent elongations the direction of the current is opposite with the pulling forces off and on. It seems, in fact, that the permanent elongation must exceed a definite limit to produce the reverse thermo-electric effects which Kelvin observed with the longitudinal force on and removed. I hope to further investigate this point and to report the results to the Society.

[1] Dr. Anderson, Chemical Laboratory, the University, Glasgow, gave me the following analyses for reostene and for manganin:—

Reostene.			Manganin.		
Si	0·61	per cent.	Sn	0·073	per cent.
Fe	79·95	,,	Fe	0·6	,,
Ni	16·53	,,	Cu	86·62	,,
Mn	1·21	,,	Mn	8·031	,,
			Ni	3·261	,,
Total	98·30		Total	98·585	

[2] Dr. Anderson analysed the commercial lead, and found it contained 99·12 per cent. of lead.

Physical Society, March 9.—Prof. Everett, F.R.S., Vice-President, in the chair.—A paper on the damping of galvanometer needles was read by Mr. M. Solomon. The solution of the equation of motion for a magnetic needle, swinging in a uniform magnetic field, points to the conclusion that the ratio of the period to the logarithmic decrement is independent of either the moment of the needle or the strength of the controlling field, and is simply a function of the damping coefficient and the moment of inertia of the moving system. This ratio should therefore be constant if these latter quantities are constant. Experiments to test the constancy of period to logarithmic decrement have been conducted at the Central Technical College at various times since 1891, and they have invariably pointed to a variation in the value of the ratio. The object of the present paper is to discover the cause of this variation. It may be due to an alteration in the moment of inertia or to an alteration in the damping coefficient. If the control magnets are either directly above or directly below the needle, there is no chance of any change in moment of inertia. The damping coefficient depends on three things: (1) Viscosity of the air; (2) viscosity of the suspension; and (3) eddy currents. The author has carried out experiments with a galvanometer on open circuit, and finds a constant value for the ratio. The viscosity of the air and suspension therefore cause no variation. Upon closing the circuit and repeating the experiments, the value of period over logarithmic decrements alters. The variation is therefore due to eddy currents. The damping factor due to eddy currents may vary owing to three causes: (1) Change in moment of needle due to change in field strength; (2) effects of self-induction; (3) effects of rise of temperature on the resistance of the coils. The author points out that the two latter causes would tend to alter the ratio in the wrong direction, and he therefore concludes that the variation is due to an alteration in the strength of the swinging needle produced by altering the strength of the controlling field. Mr. Blakesley said it was interesting to note the fact that the ratio of period to decrement was independent of the controlling field. In the case of a condenser discharging this ratio is independent of the capacity; in the case of a tuning fork, of the rigidity; and in the case of water oscillating up and down in a U-tube, of the acceleration due to gravity. Mr. Rosenbaum said that the ratio considered was constant in the case of a Nalder D'Arsonval galvanometer. Mr. Solomon said that his arguments did not apply to a galvanometer of this description, because the swinging system was not a magnetic needle but simply a coil.—A paper on the distribution of a gas in an electric field was read by Mr. G. W. Walker. The author has considered a gas as consisting of a number of molecules each containing two atoms of equal mass, one positively and the other negatively charged with electricity. When under the action of electrical forces some of the molecules split up, and we arrive eventually at a steady state in which there is a definite number of undissociated molecules and of free positive and free negative atoms. Treating the problem as one-dimensional the potential at any point is expressed in general by elliptic functions, and is therefore periodic. Applying the results to the case of a vacuum tube, it is found that there is superimposed upon the gradual fall of potential along the tube minor periodic variations which it is suggested are connected with the striæ of discharge. Both the matter density and the electric density are periodic along the tube. If the places of maximum matter density coincide with the places of minimum electrical action, then whether luminosity is due to collisions or recombinations there will be maximum luminosity at these points. In general these points do not coincide, and thus the positions of maximum luminosity are not clearly defined. The analysis leads to the conclusion that the distance between the striæ is inversely proportional to the density of the gas and to the current strength, and these facts have been experimentally verified.—Mr. C. E. S. Phillips exhibited a surface tension

lecture experiment. The effects of surface tension were exhibited by placing water between two pieces of microscope cover glass. When the glasses are circular they set in any position, and one can be made to rotate upon the other. If the plates are square or elliptical they set in a definite position, to which they immediately return if displaced. Mr. Phillips pointed out how two circular discs with liquid between could be used from which to suspend the moving system of a galvanometer. Mr. Cochrane suggested the use of some liquid which would evaporate less quickly than water. Mr. Blakesley asked what accuracy could be obtained with such an arrangement, and what weight it would be possible to support without squeezing out the water.—The meeting then adjourned until March 23.

Zoological Society, March 6.—Dr. W. T. Blanford, F.R.S., Vice-President, in the chair.—Mr. G. A. Boulenger, F.R.S., described eight new species of reptiles and batrachians from Borneo, which had been forwarded to him by Mr. R. Shelford, the curator of the Sarawak Museum. One of them formed the type of a new genus proposed to be named *Lepturophis*.—Mr. F. E. Beddard, F.R.S., read a description of the brain of the Siamang (*Hylobates syndactylus*), based upon a specimen taken from an animal which had recently died in the Society's Gardens. The form of the brain did not appear to differ materially from that of other species of *Hylobates*.—A communication from Miss E. M. Bowdler Sharpe contained a list of twenty-nine species of butterflies, of which specimens had been collected by Mr. J. Lewis Bonhote in the Bahama Islands in 1898. Of these, one species, viz. *Papilio bonhotei*, was described as new.—A communication was read from Mr. J. Lewis Bonhote, containing an account of the mammals collected by Mr. T. H. Lyle in Siam. The collection comprised specimens of twenty species, one of which, viz. *Petaurista lylei*, was described as new, and the others were enumerated in the paper. A large series of specimens of a squirrel (*Sciurus finlaysoni*) was contained in the collection, and from an examination of them the author was able to corroborate Mr. Thomas's remarks (*P.Z.S.* 1898, p. 245) that, so far as our present knowledge is concerned, the variations met with in this species follow, apparently, none of the ordinary laws which are usually supposed to govern such cases.—Mr. G. E. H. Barrett-Hamilton contributed a paper on a small collection of mammals brought home by Captain H. H. P. Deasy from Central Asia. The most interesting specimens were three examples of the rare *Euchoreutes naso*, a novelty to the collection in the British Museum, and specimens of new species of Vole and Jerboa.—Mr. Martin Jacoby read a paper on new species, one hundred in number, of Phytophagous Coleoptera from South and Central Africa.

CAMBRIDGE.

Philosophical Society, February 19.—Mr. Larmor, President, in the chair.—The President announced that the adjudicators of the Hopkins Prize for the period 1891–1894 have awarded the prize to W. D. Niven, F.R.S., formerly Fellow of Trinity College, for his memoir on ellipsoidal harmonics (*Phil. Trans.* 1891) and other valuable contributions to applied mathematics. The following communications were made to the Society:—A suggestion as to a possible explanation of the origin of some secondary sexual characters in animals as afforded by observations on certain salmonids, G. E. H. Barrett-Hamilton. Attention was directed to the phenomena attendant upon the spawning of the anadromous salmonids of the genus Onchorhynchus, which, it was suggested, would be found to throw light on the origin of secondary and other sexual characters in animals.—On supernumerary teeth, W. L. H. Duckworth and D. H. Fraser. The observations which were brought before the notice of the Society dealt with the occurrence of supernumerary teeth in adult human crania. The essential fact demonstrated was the frequent presence of small dental masses in a particular position on the alveolar margin of the upper jaw, viz. between the second pre-molar and the first molar teeth. The authors thought they were justified in the conclusion that some of these masses are to be regarded as vestiges of what would be third pre-molars, and inferred that the condition is consequently to be considered as constituting an approximation to the Platyrrhine type of primate dentition.—On the physical characteristics of some Eskimo from Labrador, W. L. H. Duckworth and B. H. Pain. The subjects of this communication are a party of Eskimo, some twenty-five in number, who were exhibited in the "Eskimo encampment" at "Olympia," in London, at the latter end of last year and in January of the present year. The observations dealt with the external characters of these people; measurements were obtained which conveyed an idea of their physical proportions, and some of their words were recorded by means of the phonograph. The measurements bear an interesting relation to those obtained from the skeletons of Eskimo from Labrador presented by Dr. Curwen, of St. John's College, to the University Anatomical Department.—On the zoological position of *Palaeospondylus*, J. Graham Kerr. Evidence was brought forward which suggested the possibility of *Palaeospondylus* being really a young Dipnoan fish.—On the extraction of gases from small quantities of blood, J. Barcroft. The principle of the apparatus demonstrated is the ordinary one of extracting the gases from measured quantities of blood in vacuous receivers with an air pump. The leading feature of the apparatus is that the measuring burette, the vacuous receivers and the gas pump are in one piece, so that there is no opportunity for the blood or the gases to be contaminated with air.—On the separation of a pure proteid from egg-white, F. G. Hopkins. A process was described by means of which a crystalline albumen can be obtained from egg-white, which upon repeated fractional crystallisation shows complete constancy of rotatory power and of percentage composition. It yields therefore satisfactory evidence of being a chemical individual, and should form satisfactory material for chemical study.

EDINBURGH.

Royal Society, February 5.—Prof. Duns in the chair.—Prof. J. Gibson and Mr. A. W. C. Menzies exhibited their form of thermostat, which is heated and regulated by electricity. The heating is effected by means of four or five ordinary incandescent electric lamps, set below the jacketed tank containing the water, whose temperature is to be kept steady. After the temperature has been raised to the desired point, a simple form of automatic cut-out is arranged to work an electric relay, which puts out the electric lamps when the temperature rises slightly above the desired temperature, and allows them to be re-lighted when the temperature falls slightly below that point. One important practical advantage of the method lay in the fact that the operator was rendered quite independent of the gas supply. By its means they had been able to keep the temperature steady within a range of a tenth of a degree for months, and at comparatively little cost.—Dr. W. Peddie read a paper on the law of elastic fatigue. In a former paper on the torsional oscillations of wires it was pointed out that the empirical formula, which very accurately represents the relation between amplitude of oscillation and the number of oscillations that have taken place since the wire was left to itself, indicates the existence of a condition in which elastic fatigue is diminished by previous oscillations of the wire. But the truth of this result depended, in the series of experiments then discussed, upon the formula applying, with unmodified parameters, to a range outside that dealt with in the experiments. It was now shown that, with one exception, fatigue had been induced by previous oscillations in all series of experiments hitherto made upon both steel and iron wires. In the exceptional case the reverse may be true in part of the experimental range. The angle of oscillation (provisionally called the *critical angle* in the former paper), which separates the two conditions, occurs well within the experimental range. At larger angles fatigue is induced by previous oscillations; at smaller angles it seems to be increased.—In a note on magnetic screening, Dr. C. G. Knott gave an account of a new method of exploring the field inside a hollow tube or sphere of magnetic metal, specially applicable to cases in which the interior is very narrow or difficult of access. The idea had been in his mind for many years, but only recently, in connection with an investigation on magnetic strains in small iron and nickel spherical shells, had he found occasion to test the method experimentally. The method consisted in comparing the twist produced in a nickel wire carrying a given current and magnetised longitudinally in various fields: (1) when the nickel wire alone occupied the heart of the magnetising coil; (2) when either the iron or nickel shell was introduced so that the nickel wire lay wholly within it. This required the nickel wire to be shorter than the diameter of the spherical shell. It was found, for example, that it required a field 660 when the iron shell surrounded the wire to produce the same twist effect as was produced by field 200 when the nickel shell surrounded the wire; and that the same effect was produced by field 50 when the wire was sur-

rounded by neither shell.—Dr. John Henderson communicated a paper on the Clark cell *versus* the cadmium cell as a standard of electromotive force. In addition to an account of the various modifications of Clark cell which had been made with a view to improve it as a satisfactory standard of E.M.F., and a discussion of the work done by others in regard to the cadmium cell, the author gave a full description of his own elaborate experiments. He experimented on a great variety of modifications; and his conclusions were that as regards constancy of E.M.F., smallness of temperature coefficient, power of recovery after being short-circuited, its practical identity though made of materials supplied commercially by different manufacturers, and other essential characteristics of a practical standard of electromotive force, the cadmium cell was in all respects superior to the Clark cell.—Dr. Hugh Marshall communicated a short paper on the action of silver salts on solution of ammonium persulphate, in which he called attention to two striking reactions which he had recently observed and was investigating. When a small quantity of silver salt is added to a strong ammoniacal solution of persulphate, nitrogen is evolved almost immediately; the temperature rises rapidly, and the action may soon become violent. Apparently the silver is rapidly peroxidised by the persulphate and reduced by the ammonia. An aqueous solution of ammonium persulphate is steadily decomposed at the ordinary temperature in presence of small quantities of silver salts; there is no evolution of gas, *part of the nitrogen of the ammonium salt being converted into nitric acid*, as shown by the equation:

$$8(NH_4)_2S_2O_8+6H_2O=7(NH_4)_2SO_4+9H_2SO_4+2HNO_3.$$

It was found that, in the space of two to three days a milligram-equivalent of silver salt per litre of solution decomposed one-half of the persulphate originally present, the temperature being 20°.

PARIS.

Academy of Sciences, March 3.—Mr. Maurice Lévy in the chair.—Remarks by M. Picard on his work on the theory of algebraic functions of two variables.—On the tetrahedral symmetry of the terrestrial globe, by M. de Lapparent. Remarks on a paper on the same subject by M. Marcel Bertrand. The author thinks that while the original view of Lothian Green groups the main facts of the geography of the earth round a remarkably simple idea, an idea which moreover follows from the principle of least action, the modifications introduced by M. Bertrand into the original hypothesis have the effect of destroying its simplicity and usefulness. The idea that the effect is due to a slow cooling would also have to be abandoned.—Observations on the preceding note, by M. Marcel Bertrand. A detailed reply to the criticisms of M. de Lapparent.—Preparation and properties of a manganese perfluoride, by M. Henri Moissan. The new fluoride has the composition Mn_2F_6, and is formed by the action of fluorine gas upon manganese iodide.—A tubular furnace, working at any fixed temperature, by M. Armand Gautier. An application of the reverberatory principle to a combustion furnace.—Morphology of the pelvic girdle in Amphibia, by M. Arm. Sabatier.—On the Dinosaurians in the strata of Rognar and Vitrolles at the foot of Montagne-Noire, by M. Charles Depéret.—Prof. E. Fischer was elected a Correspondant for the Section of Chemistry.—Observations of the Giacobini comet (1900 *a*) made at the Observatory at Algiers with the 31·8 cm. equatorial, by MM. Rambaud and Sy.—New determinations of *g*, by M. J. Collet. A study of the deviations from the normal value in the neighbourhood of a mountain mass. The mean results at Grenoble, Saint-Agrève, and Le Lautaret are given.—On a theory of systems of total differential equations of the second order, by M. Ernst Pascal.—On the electric charge of the deviable rays of radium, by M. P. Curie and Mme. M. P. Curie. The authors prove that that part of the radiation from radium which is deviated in a magnetic field carries a negative charge of electricity, in a similar manner to the kathode rays. Parallel experiments carried out with the Röntgen rays showed similar effects, but to a very slight extent, and the conclusion is drawn that if the X-rays are charged with electricity, they are much more feebly charged than the radium rays.—Disymmetry in the polarised emission of a Geissler tube submitted to the action of a magnetic field, by M. R. Dongier.—On the constitution of the yellow sodium rays, by MM. Ch. Fabry and A. Perot. An application of the interferential spectroscope previously described by the authors. The complicated and variable results obtained by M. Michelson with the D-lines are here shown to be due to the reversal of the rays. Sodium vapour possesses an enormous absorptive power, even at a low temperature and very feeble pressure.—On the spectra of the polar aurora, by M. Paulsen.—On the preparation of the phosphides of iron, nickel, cobalt and chromium, by M. Georges Maronneau. Phosphide of copper heated in the electric furnace with either of these four metals to a temperature above the boiling point of copper, gives the phosphide of the metal added, which can be extracted in a pure state by treating the fused mass with nitric acid. The properties of Fe_2P, Ni_2P, Co_2P and CrP are described.—On eugenol, safrol and propylpyrocatechol, by M. Raymond Delange. The methyl ether of eugenol, reduced with sodium and boiling alcohol, gives propylveratrol, which on hydrolysis with hydrochloric acid furnishes propylpyrocatechol.—On the diazotising of safranine, by M. George F. Jaubert. When diazotised under ordinary conditions the monodiazo-compound is the only product. Both the red mono-acid salt and the blue di-acid salt give the same result, but the green tri-acid salt uses twice as much sodium nitrite, and hence corresponds to an azonium base of orthoquinonoid structure.—The modifications brought about by a longitudinal traction in the stems of plants, by M. Thouvenin. In the plant studied, *Zinnia elegans*, a moderate longitudinal pull retards the development of the secondary fibro-vascular bundles.—Variations in the characters of species of haricots under the influence of grafting, by M. Lucien Daniel. An investigation to determine how far the properties acquired by grafting can be transmitted in the case of an annual, such as haricots, by the seed. It is found that grafting always produces variation in the plants grown from seed, this variation being less marked in wild species grafted between themselves, and more accentuated in the cultivated plant.—The work of spinal nervous centres, by Mlle. J. Joteyko. The nerve may be excited for more than four times the period producing fatigue in the muscle, without showing signs of fatigue. The spinal nervous centres thus show a very high resistance.—New method of measuring the tactile sensibility to pressure of mucous and cutaneous surfaces, by MM. Ed. Toulouse and N. Vaschide.—Concerning the physiological alternation of the kidneys, by MM. E. Bardier and H. Frenkel. The experiments quoted show that there is no real physiological alternation of the kidneys, neither from the point of view of the vaso-motor phenomena nor from that of the flow of urine.—Hepatic glycogen during pregnancy, by MM. A. Charrin and A. Guillemonat.

NEW SOUTH WALES.

Royal Society, December 6, 1899.—The President, W. M. Hamlet, in the chair.—On the Darwinias of Port Jackson and their essential oils, by R. T. Baker and H. G. Smith. The authors show that one of the species of the genus—the shrub, botanically known as *Darwinia fascicularis*, A. Rudge—which occurs plentifully on the sandstone formation around Port Jackson, is a plant of great commercial importance in regard to its essential oil. This plant belongs to the natural order Myrtaceæ, a genus so prolific in oil-yielding species. The oil consists principally of the important ester geranyl acetate, the least amount of this constituent being 56·7 per cent. and the greatest 65·1 per cent., obtained from the oil distilled in November. Besides this ester, 13·11 per cent. of free alcohol was determined, calculated as geraniol.—On New South Wales copper ores containing iodine, by Arthur Dieseldorff. The author (who was on a visit to New South Wales a few years ago) was interested in the discovery of iodine in a sample of cuprite from Cobar by Dr. W. Autenrieth, of the University of Freiberg, Baden. He made further investigations himself as shown by the paper, resulting in his proving the presence of iodine in several different samples sent to him from the colony.—Orbit elements Comet I. 1899 (Swift), by C. J. Merfield. The orbit elements have been deduced from the observations taken at most of the leading observatories. Sixteen equations of condition have been employed in finding the corrections to the assumed parabolic elements. The result of the investigation seems to indicate that the geometrical figure described by this comet is an hyperbola.—On the composition of New South Wales labradorite and topazes, with a comparison of methods for the estimation of fluorine, by G. Harker. The paper gives the composition and properties of a typical labradorite from New England, New South Wales, and also the composition including the water of constitution of two varieties of topazes found in New South Wales, one from the Mudgee the other from the New England district. It describes also the results obtained for the percentage of

fluorine in topaz by three different methods, viz. by fusing the topaz with alkaline carbonates alone (Wöhler), by liberating the fluorine as silicon tetra-fluoride and weighing as potassium silicon-fluoride (Liversidge), and by decomposing with alkaline carbonates and silica (Berzelius-Rose). The last method gave the best results, and very probably the whole of the fluorine is obtained by this method.—Note on a remarkable increase of temperature after dark at Seven Oaks, Macleay River, by Hugh Charles Kiddle.—Records of rock temperatures at Sydney Harbour Colliery Birthday Shaft, Balmain, Sydney, by J. L. C. Rae, E. F. Pittman and Prof. T. W. E. David.—The deep sinking now being carried on at the Sydney Harbour Colliery, Balmain, with which one of the authors is actively associated, affords a very favourable opportunity of noting the nature and temperatures of the various rocks underlying the neighbourhood of Sydney, and this the authors are utilising. The paper read deals with the temperatures noted to a depth of 1450 feet, which was the depth reached in the shaft at the middle of November. The thermometers used were specially supplied by Prof. Everett, F.R.S., Secretary of the British Association Committee on the subject of underground temperatures. If the mean annual temperature of Sydney be taken as 63° Fahr., the rate of increase is shown, by the observations made, to be at the rate of 1° Fahr. for every 90½ feet. A remarkable increase of temperature was noted as the sinking passed from the Hawkesbury Sandstones into the Narrabeen Beds, the upper section of which consists of chocolate shales.—Note on the edible earth from Fiji, by the Hon. B. G. Corney, Prof. David and F. B. Guthrie. The sample of edible earth, a soft, pale pink, clayey material, with occasional lumps of chalcedony, was collected by Dr. Corney, near the northern coast of Vanua Levu. Silica, alumina and combined water are present in approximately the proportion required by the formula $Al_2O_3(SiO_2)_2(H_2O)_2$; the substance appears, therefore, to be a silicate of that composition—probably kaolinite—with about 7·6 per cent of uncombined ferric oxide as mechanical impurity.

DIARY OF SOCIETIES.

THURSDAY, MARCH 15.

ROYAL SOCIETY, at 4.30.—Total Eclipse of the Sun, January 22, 1898. Observations at Viziadrug: Sir N. Lockyer, K.C.B., F.R.S., Captain Chisholm-Batten, R.N., and Prof. Pedler, F.R.S.—A Comparative Crystallographical Study of the Double Selenates of the Series $R_2M(SeO_4)_2.6H_2O$. Part I. Salts in which M is Zinc: A. E. Tutton, F.R.S.—The Theory of the Double Gamma Function: E. W. Barnes.

ROYAL INSTITUTION, at 3.—Recent Excavations in Greece: Dr. C. Waldstein.

LINNEAN SOCIETY, at 8.—Report on the Botanical Results of an Expedition to Mount Roraima, in British Guiana, undertaken by F. V. McConnell and J. J. Quelch, W. Botting Hemsley, F.R.S., and others.—Bryozoa from Franz Josef Land, collected by the Jackson-Harmsworth Expedition, 1896-97: A. W. Waters.

CHEMICAL SOCIETY, at 8.—The Vapour Densities of Dried Mercury and Mercurous Chloride: H. Brereton Baker.—(1) The Preparation of Pure Hydrobromic Acid; (2) A New Sulphide of Arsenic: Dr. A. Scott, F.R.S.—The Action of Iodine on Alkalis: R. L. Taylor.—The Interaction between Sulphites and Nitrites: Dr. Edward Divers, F.R.S., and Dr. Tamemasa Haga.—New Polysaccharides: Manno-galactan and Lævulo-mannan: Julian L. Baker and Thomas H. Pope.

FRIDAY, MARCH 16.

ROYAL INSTITUTION, at 9.—Pictorial Historical Records: Sir Benjamin Stone.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—Measles: its Distribution and Control: Dr Robinson.

SATURDAY, MARCH 17.

ROYAL INSTITUTION, at 3.—Polarised Light: Lord Rayleigh.

MONDAY, MARCH 19.

SOCIETY OF ARTS, at 8.—The Photography of Colour: E. Sanger Shepherd.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Explorations in the Patagonian Cordilleras: Dr. Hans Steffen.

TUESDAY, MARCH 20.

ROYAL INSTITUTION, at 3.—Structure and Classification of Fishes: Prof. E. Ray Lankester, F.R.S.

SOCIETY OF ARTS (Foreign and Colonial Section), at 4.30.—Imperial Telegraph Communication: Sir Edward A. Sassoon, Bart.

ZOOLOGICAL SOCIETY, at 8.30.—Field Notes on some of the East African Mammals (illustrated with Lantern Slides): S. L. Hinde.—On a Case of Homœosis in *Asellus*—Antennule replaced by a Mandible: W. Bateson, F.R.S.—On Echinoderms from Singapore and Malacca: F. P. Bedford.

ROYAL GEOGRAPHICAL SOCIETY, at 4.—Twelve Years' Work of the Ordnance Survey: Colonel Sir John Farquharson, K.C.B.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Great Central Railway Extension—Northern Division: F. W. Bidder.—The Great Central Railway Extension—Southern Division: F. Douglas Fox.

ROYAL PHOTOGRAPHIC SOCIETY.—A Demonstration of the Heliogravure Process: Ignatz Herbst.

ROYAL STATISTICAL SOCIETY, at 5.30.

WEDNESDAY, MARCH 21.

SOCIETY OF ARTS, at 8.—The Use and Abuse of Food Preservatives: Dr. Samuel Rideal.

GEOLOGICAL SOCIETY, at 8.—On a Bird from the Stonesfield Slate: Prof. H. G. Seeley, F.R.S.—The Lower Ludlow Formation and its Graptolite-Fauna: Miss Ethel M. R. Wood.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—The Ether Sunshine Recorder: W. H. Dines.—Remarks on the Weather Conditions of the Steamship Track between Fiji and Hawaii: Captain M. W. C. Hepworth.—Comparison by means of Dots: Alexander B. MacDowall.

ROYAL MICROSCOPICAL SOCIETY, at 7.30.—Exhibition of Slides of New, Rare, and Foreign Rotifera, by C. F. Rousselet.

ENTOMOLOGICAL SOCIETY, at 8.

THURSDAY, MARCH 22.

ROYAL SOCIETY, at 4.30.—The Croonian Lecture: Immunity, with Special Reference to Cell Life: Prof. Paul Ehrlich (of Frankfort-on-Main).

ROYAL INSTITUTION, at 3.—Equatorial East Africa and Mount Kenya: H. J. Mackinder.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Storage Battery Problems: E. J. Wade.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Adjourned Discussion on Improvements in the Longworth Power-Hammer, and Portable Pneumatic Tools.—*Paper to be read:* Observations on an Improved Glass Revealer, for Studying Condensation in Steam-Engine Cylinders and rendering the Effects Visible: Bryan Donkin.

FRIDAY, MARCH 23.

ROYAL INSTITUTION, at 9.—Some Modern Explosives: Sir Andrew Noble.

PHYSICAL SOCIETY, at 5.—An Electromagnetic Experiment: Prof. S P. Thompson, F.R.S.—(1) Some Experiments illustrating Syntony; (2) An Electrical Micrometer: P. E. Shaw.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Development of the Modern Locomotive Engine: J. W. Cross.

SATURDAY, MARCH 24.

ROYAL INSTITUTION, at 3.—Polarised Light: Lord Rayleigh.

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